

R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

The November 8, 2000 Office Action and the Examiner's comments have been carefully considered. In response, the description, drawings and claims are amended, and remarks are set forth below in a sincere effort to place the present application in condition for allowance. The amendments are supported by application as originally filed. Therefore, no new matter is added.

DRAWINGS

In the Office Action the drawings are objected to because of certain informalities. Specifically, the Examiner requests that Fig. 1 be amended to change "image synthesizing section 6" to --image joining section 6--, in Fig. 19 the sign "X" of element 15 be changed to --+--, in Fig. 22 to label the divider with reference numeral 25, and to label Figs. 20, 21, 23A, 23B and 23C as --PRIOR ART--. Submitted concomitantly herewith is a Letter to the Official Draftsperson requesting approval of the proposed drawing changes to Figs. 1, 19, 20, 21, 22, 23A, 23B and 23C. In view of the foregoing amendments, reconsideration and withdrawal of the objection to the drawings are respectfully requested.

SPECIFICATION

In the Office Action the disclosure is objected to because of an informality at page 4, line 14. In response, an appropriate amendment has been made to page 4 of the specification.

In addition, the Examiner objects to the title of the invention as not being descriptive. In response, the title is amended to be more clearly directed to the claimed invention. If, even in view of the amendment of the title the Examiner maintains his objection to the title, the Examiner is respectfully requested to provide a proposed title for consideration by the applicants in the next Patent Office communication.

In view of the foregoing amendments and remarks, reconsideration and withdrawal of the objection to the disclosure are respectfully requested.

CLAIM OBJECTION

In the Office Action claims 1, 4, 6, 8 and 11 are objected because of informalities set forth in item 8 spanning pages 4-5 of the Office Action. In response, claims 1 and 11 are amended in a sincere effort to obviate the objections thereto. In view of the amendment of claims 1 and 11, reconsideration and withdrawal of the objection to the claims are respectfully requested.

PRIOR ART REJECTIONS

In the Office Action claims 1, 4, 6, 8, 13, 18, 21 and 26 are rejected under 35 USC 102(e) as being anticipated by USP 6,097,432 (Komiya et al). In addition, claims 11, 15, 16, 23 and 24 are rejected under 35 USC 103 as being unpatentable over Komiya et al. In response, claims 1, 13, and 21 are amended to more clearly define the present claimed invention over the cited reference. In addition, claims 1, 13 and 21 are amended to more clearly comply with the requirements of 35 USC 112 and to be in better form for consideration by the Examiner.

The present invention defined by amended claim 1 is directed to an apparatus which synthesizes a plurality of images into one image wherein the user operates a device (knob) provided on the apparatus while viewing the image on the monitor, to set a correction parameter necessary for correcting the distortion of the images or the difference in color information between the images. (This technique corresponds to claims 1,3-9, 13, 17-19, 21 and 25-27 and Figs. 1-13). Instead of operation of the knob, correction parameters for the camera may be stored as a file, and one of the parameters is set after being selected from the file. (This technique corresponds to claims 11, 12, 15, 16, 23 and 24 and Fig. 2.)

Komiya et al (cited in the Office Action) teach that a user needs to know in advance the parameters of the optical system and photographing condition necessary for correction of distortion

aberration as disclosed in the "Background of the Invention" portion of the present specification.

In contrast, the apparatus of the present claimed invention enables the user to easily correct the aberration while checking the image on the display or the like, and synthesizes the images subjected to correction to obtain an image having a high resolution and a wide viewing angle.

For example, in the first embodiment of the present invention, when the user operates an adjusting knob while viewing the image displayed by such a display as Fig. 3 shows, and judges that correction is sufficiently performed, the user presses an "OK" key to determine coefficients A1 and A22.

In order to obtain such specific advantages, the present invention, as taught in the amended claims, has "correction parameter setting means" and "optical parameter setting means", which are not disclosed, taught or even suggested in the above cited Komiya et al reference. That is, the present claimed invention as defined by claims 1, 13 and 21 are patentable over Komiya et al because Komiya et al do not disclose, teach or suggest, inter alia:

1. correction parameter setting means for setting a correction parameter necessary to correct at least distortion of said plurality of image parts generated in each overlap area or a difference between the image parts wherein said correction parameter setting means

is allowed to be manually operated by a user to set the correction parameter (see claim 1, lines 7-12; claim 13, lines 6-10; and claim 21, lines 7-12); and/or

2. optical parameter setting means for determining, as an optimal value, the correction parameters set by said correction parameter setting means, when it is judged by the user from display by the display means that correction is sufficiently performed by said image correction means (see claim 1, lines 24-28; claim 13, lines 23-27; and claim 21, lines 25-29).

Accordingly, it is respectfully submitted that the present claimed invention is patentable over Komiya et al under 35 U.S.C. 102 and 35 U.S.C. 103.

Claims 4, 6, 8, 11, 15, 16, 18, 23, 24 and 26, which are dependent on one of claims 1, 13 and 21, are patentable for reasons, inter alia, set forth above in connection with claims 1, 13 and 21.

* * * *

If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

Entry of the amendment, allowance of the claims, and the passing of the application to issue are respectfully solicited.



If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Robert P. Michal".

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Encs.: (1) LETTER TO THE OFFICIAL DRAFTSPERSON
(2) Copy of amended claims showing changes made thereto
(3) Copy of changes made to the specification
(4) Petition for Extension of Time



COPY OF AMENDED CLAIMS SHOWING CHANGES BEING MADE THERETO
SERIAL NO. 09/964,180

IN THE CLAIMS:

Please amend claims 1, 11, 13 and 21, as follows:

1. (Amended) An image processing apparatus comprising:

image input means for getting a plurality of image parts
dividing one composition such that the image parts have
overlapping areas, each having the same image of an object in the
overlapping area as in the overlapping area of the next image
part;

correction parameter setting means for setting a correction
[parameters] parameter necessary to correct at least distortion
of said plurality of image parts generated in each overlap area
or a difference between the image parts, said correction
parameter setting means being allowed to be manually operated by
a user to set the correction parameter;

image correcting means for correcting at least one image
part of said plurality of image parts in accordance with said set
correction parameter to eliminate at least distortion of said
plurality of image parts generated in each overlap area or the
difference between the image parts;

image joining means for sequentially joining the plurality
of image parts corrected by said image [correction] correcting
means in said overlap area to restore said one composition; [and]

20 image display means for [display] displaying at least said plurality of image parts input by said image input means or said image parts corrected by said image correction means[.]; and
optical parameter setting means for determining, as an optimal value, the correction parameter set by said correction
25 parameter setting means, when it is judged by the user from display by said display means that correction is sufficiently performed by said image correction means.

11. (Amended) The image processing apparatus according to claim 4, [wherein] further comprising correction parameter storing means for storing one or a plurality sets of said correction [parameters] parameter used in correcting said image in connection with the name of the imaging apparatus used to take
5 the image, and said correction parameter setting means selects a desired set of correction parameters from the correction parameters.

13. (Amended) An image processing method comprising:
an image input step of getting a plurality of image parts dividing one composition such that the image parts have overlapping areas, each having the same image of an object in the overlapping area as in the overlapping area of the next image
5 part;

a correction parameter setting step of setting a correction [parameters] parameter necessary to [for] correct at least [images] image distortion or image difference occurring in the overlapping areas of each image part, said correction parameter setting step being allowed to be manually operated by a user to set the correction parameter;

an image correcting step of correcting at least one of said plurality of image parts in accordance with said correction parameters, thereby to correct distortion of images or image difference occurring in at least the overlapping area of each image part;

a composition restoring step of restoring said composition by sequentially combining said plurality of image parts corrected, one to another, with overlapping the same at overlapping areas; and

an image displaying step [of display] for displaying at least said plurality of image parts input or said plurality of image parts corrected[.]; and

an optimal parameter setting step for determining, as an optical value, the correction parameter set by said correction parameter setting step, when it is judged by the user from display during said image displaying step that correction is sufficiently performed by said image correcting step.

21. (Amended) A recording medium recording computer programs for restoring an image by combining a plurality of image parts divided from one composition, each image [parts] part having the same image of an object in an overlapping area, said recording medium recording:

5 an image inputting program for inputting said plurality of image parts;

 a correction parameter setting program for setting correction parameters indispensable for correcting [images] image distortion or image difference occurring in at least the
10 overlapping areas of each image part, said correction parameter setting program being allowed to be manually operated by a user to set the correction parameter;

 an image correcting program for correcting at least one of said plurality of image parts in accordance with said correction
15 parameters, thereby to correct distortion of images or image difference occurring in at least the overlapping areas of each image part;

 a composition restoring program for restoring said composition by sequentially combining said plurality of image
20 parts corrected, one to another, with overlapping the same at overlapping areas; and

 an image displaying program for displaying said plurality of images input, or at least one of said plurality of image parts corrected[.]; and

25 an optimal parameter setting program for determining, as an optimal value, the correction parameter set by said correction parameter setting program, when it is judged by the user from display of said displaying program that correction is sufficiently performed by said image correction program.



an object 5 to have the overlapping area.

An output signal of each image pickup section 3 is digitized by the A/D converter 4 so as to be input to each of image correcting sections 17a to 17c. Each of the image correcting sections 17a to 17c reads photographing conditions such as a focus position when a image is taken and a characteristic parameter of the optical system so as to correct the distortion of the images taken by the image input sections 1a to 1c.

Next, in an image joining section 6, the images (serving as input signals), which are corrected by the image correcting sections 17a to 17c, are joined to be a wide-angle image as shown in FIG. 20. Then, the joined image is output to a ^{monitor 7} motor 9, a printer 8 or a storage medium 9.

The image joining section 6 is realized by the structure as shown in FIG. 19.

In this structure, the images a, b, and c are temporarily stored in a frame memory 10 respectively.

Then, an amount of parallel movement S1 and an amount of rotations R1 between the adjacent images (e.g., images a and b) are obtained by a shift detector 11a. Similarly, an amount of parallel movement S2 and an amount of rotations R2 between the images b and c are obtained by a shift detector 11b.

These amounts of parallel movement S1, S2, and amounts of rotations R1 and R2 are input to